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Official Organ of
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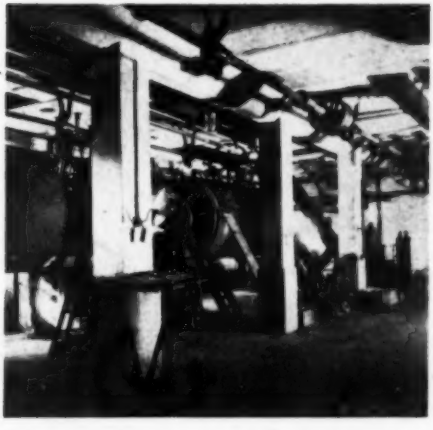

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VOLUME 4. OCTOBER NUMBER 10

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Tanks and Steel Plate Construction
For the Oil and Soap Industries

RECEIVING TANKS—SOAP KETTLES—OPEN AND VACUUM FILTER TANKS—VACUUM MIXING TANKS—HOUSE AND YARD STORAGE TANKS—PRESSURE TANKS—STACKS AND BREECHINGS—RIVETED OR WELDED PIPE.

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Filtration Facilitated by Filter Aids

Clarification of Crude or Refined Oils Best Accomplished Through Use of Special Filtering Earths

By ARTHUR ELSENBAST

THE modern trend of all manufacturing practice is toward improvement of quality and co-ordinate reduction of production costs. All progressive manufacturers, in fact, all manufacturers who hope to remain in business (and who does not), are constantly striving to raise the standards of quality of their products and to reduce the cost of production and handling of those products.

Impurities Present in Liquid Products

To the producers of liquid products; in which class are included manufacturers of chemicals, dyes, glues and adhesives, paints and varnishes, beverages, sugars and syrups, animal, vegetable and mineral oils, and many other commodities; one of the major problems of production is clarification, i.e. the manufacture of a clear, brilliant and pure liquid, free from suspended, emulsified or flocculent impurities. These impurities may be present in particles of sizes varying from those quite easily discernible to the unaided eye, down to the colloidal size which puts the impurity almost, but not quite into solution in the liquid medium, resulting in a marked departure from clarity and brilliance in the appearance of the product. The impurities which may occur in any liquid product vary, of course, according to the nature of the product, but those most frequently occurring in organic liquids of vegetable origin consist chiefly of resins, gums, albuminoids, etc., which are of such amorphous nature that they are not removable by settling or simple filtration. They can sometimes be eliminated by centrifugation, but where the volume handled is large, the investment cost of centrifugal equipment is sometimes prohibitive, the power charges being also a handicap when, as above stated, the volume is large.

Impurities of Vegetable Oils

The crude vegetable oils, coconut, peanut, soya bean, olive, and particularly cottonseed oil, as expressed from the original oil-bearing material, generally contain a considerable amount of meal, gums, resins, albuminoids and moisture, which are sometimes partially removed by sedimentation before shipment of the oil, but which remain in some amounts in practically all crude vegetable oils which reach the market, most particularly in great quantities in cottonseed oil.

In vegetable oil refining, where caustic soda is employed, there is always a finely divided flocculent soap present in the oil before filtration. If the oil is to be bleached this soap will interfere to a marked extent with the action of the bleaching mediums and if the oil is to be filtered without bleaching, these traces of soap are very difficult to remove by an ordinary filtration.

Animal Oil Impurities

Animal oils and greases, edible and inedible, are subject to impurities similar to those found in crude vegetable oils, and in addition to

particles of tissue, bone, crackling, gelatin, etc. The clarification of animal oils and removal of these impurities present the same problems to the manufacturer of this class of products as those which confront the producer of vegetable oils.

Filter Aids

In comparatively recent years producers of oils, fats and greases, vegetable and animal, have had available for their use as filter aids in the clarification of their products, types of materials known under the general classification of "infusorial" or "diatomaceous" earths. These products may be described as absorbent siliceous earths, which consist almost entirely of the fossilized siliceous skeletons of countless untold trillions of tiny extinct vegetable organisms, microscopic in size. In only a few known localities of the earth are found vast beds of clayey material which consists of the closely-packed skeletons of these pre-historic mites.

The nature of their origin accounts for the effectiveness of these earths as filter aids, since their skeletonal structure makes them exceedingly porous and absorbent, and their composition of practically pure silica renders them chemically inert, so that they do not react with any liquid in which they are used, therefore not affecting flavors or compositions.

The object of this article is to bring to the attention of the entire oil industry the news of the production of these new and improved filter-aids which can be used in such small quantities and with such good results as to make possible at low cost certain types of filtrations and clarifications which were always held desirable but which previously could not be carried out economically, such as the filtration of crude cottonseed and other vegetable oils at the crushing mills.

These new and improved filter-aids are now in wide use throughout the general chemical industries and wherever filtration and clarification work is done. They have been adopted as filter-aids by the more progressive companies engaged in animal or vegetable oil production.

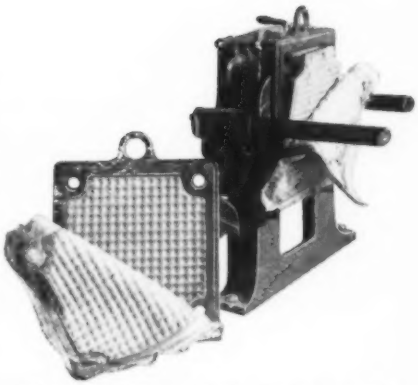
Distinction Between Diatomaceous Filter-Aids and Bleaching Clays

There is a distinct difference between, the bleaching clays and Fullers' Earths ordinarily used for filtering and clarification, and the diatomaceous earth filter-aids which we are describing in this article.

The clays are mechanically disintegrated rock products consisting of mainly aluminum calcium silicates. The clay particle is a fragment of the crushed rock with no particular crystalline form or shape. A cubic foot of these clay particles will weight ordinarily about 40 to 60 lbs., which shows that it is a very heavy dense rock originally. The reason for the bleaching properties of the clays is not very well understood but is undoubtedly due in part to their chemical composition. These clays do have decided bleaching actions on some types of both animal and vegetable oils but on certain oils and certain colors have very little effect. There are many classes of vegetable oil filtrations in which Fullers' Earths and clays have comparatively small bleaching power, particularly in view of the fact that they can only be used in comparatively small quantities by weight on the oil handled. Quantities as

a rule over 2% impart decided tastes and flavors to the oil which are impossible to remove later. On the finest and most delicately flavored lards and compounds not more than five tenths of a percent of clay can ordinarily be used. The clays pick up moisture and become gluey and gelatinous and undoubtedly either the clay is changed chemically or the oil which is treated is changed chemically by this material.

The diatomaceous earth on the other hand is inert and removes the impurities by filtration through the microscopically porous cake which is formed in the filter press. There is a certain absorption of color and impurities due to the tremendous surface area which the diatomaceous earth particles possess and to this extent the diatomaceous earth also has a certain decolorizing and bleaching effect on many liquids including vegetable oils. There are many problems in vegetable and animal oil refining in which it is only necessary to remove the suspended matter in which cases the clay or earth is added to the oil merely to act as a filter-aid. The diatomaceous earth products by virtue of their porous characteristics build up a porous cake in a filter press and give a perfect clarification. The other types of clays on account of their dense impalpable powdered structure form a very heavy dense cake on a filter cloth giving a very low rate of flow and comparatively poor clarification. Where these diatomaceous silica filter-aids are applicable, usually only about one-sixth or one-eighth of the amount by weight which would be required of ordinary bleaching clays, is needed. There are increasingly large fields becoming discovered in animal and vegetable oil work in which clarification is the only requirement.



Typical Filter-Aid Press Cake

These "keys to economical filtration are used to advantage in any standard type of filter, preferably in the press type. They can be used with hot fluids as readily as with those at ordinary temperature. In their use, full advantage is taken of the possibilities of pressure filtration and of the adaptability of the modern filter press to commercial production requirements. Many liquors now being filtered could not possibly be clarified in a filter press economically without their aid. In hundreds of standard filtration processes, costs have been reduced to a fraction of their former amount, and the quality of the filtrate materially improved through their use.

Varieties of Filter Aids

Maximum economy in filtration work demands the use of different grades of filter aids with liquids of various properties. The Celite Products Company, who are prominent manufacturers of this class of material, have published a brochure containing a very interesting description of their various filter aid products, as follows:

Filter-Cel

Since 1912, Filter-Cel has been adopted as a standard aid to filtration in one industry after another. The product itself has been continually improved so that the Filter-Cel available today is far more effective for filtration than ever before. Its uniform quality is assured by careful selection of the raw materials used and absolute control over every stage in its manufacture.

The use of Filter-Cel in filter presses assures sharp and positive separation of solids from liquids. The rate of flow secured in most cases is not as great as may be obtained with Standard or Hyflo Super-Cel.

Standard Super-Cel

This improved filter-aid gives brilliant clarity of filtrates together with very high rates of flow. It is particularly suited for the filtration of such products as sugar, syrups, extracts, cereal beverages, glycerine, pectin, many fruit juices, glue and gelatine boiling-liquors, and in general where high capacities of filter stations together with positive clarity of filtrates are desired.

Hyflo Super-Cel

This super filter-aid is adapted for the filtration of liquids which are particularly difficult to filter, in which the solids to be removed are of such size, character and quantity as to permit its use to best advantage. The rates of flow secured are often startlingly high when compared with any other method. In some classes of filtration, rates of flow more than seven times those secured with lower grades have been recorded.

Among the products which are filtered to best advantage with Hy-

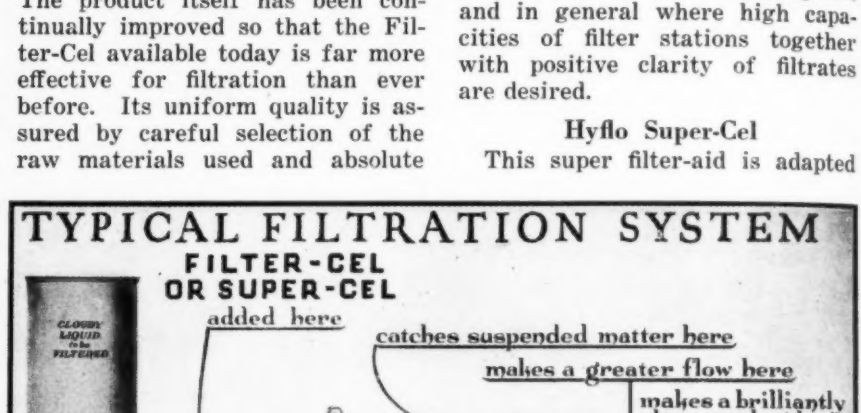


Photo courtesy Celite Products Co.

Filtration Equipment Layout

flo Super-Cel are varnish, adhesives, cider, linseed oil, tallow, chemical products, liquid soap, evaporated glue and gelatine liquors, vegetable oils (cold filtration) and some sugar liquors.

All filter-aids should be effectively sterilized in the process of manufacture. This is a direct advantage in some types of filtration.

In processes where the filter cake is "washed" to recover liquor contained in the cake, the use of Standard or Hyflo Super-Cel greatly facilitates "washing." Furthermore, due to the small percentage of Super-Cel ordinarily employed as compared to other filter-aids there is less loss of the product due to retention in the cake.

The Selection of Filter-Aids

Celite filter-aids are most generally applied to "clarification filtrations." This covers liquids in which the volumetric percentage of solids to be removed is less than 2 per cent of the total liquid.

In some liquids the particle size of the suspended solids verge to the ultra-microscopic or colloidal and the total weight of these solids may be less than one-tenth of one per cent of the total weight of liquor. The size of the solid particles as well as their physical characteristics, whether they are gummy, rigid, etc., determine which grade of filter-aid should be used.

It is possible to select the particular Filter-aid which will form filter cakes of any desired capillary resistance to correspond with the variation in size, type and amount of suspended matter which must be removed from the liquid by filtration.

Filter-aids afford a wide range of possibilities in filtration work. To select the grade which will give maximum economy and use it to the best advantage often require plant and laboratory tests with each filter-aid.

Making Plant Trials

In making plant trials to determine which filter-aid to use, it is suggested that the highest grade aids be tried first inasmuch as this material gives the maximum rate of flow with minimum filter-aid consumption where its use is practical.

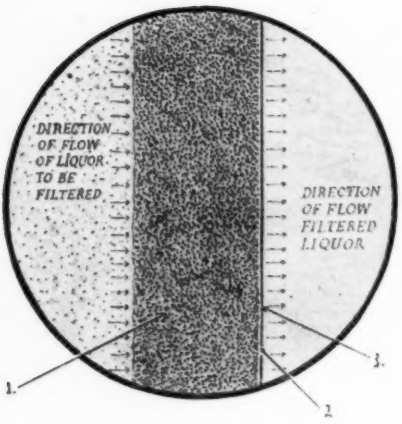
A safe excess of filter-aid should always be used on the first run in order to insure maximum rate of flow and brilliantly clear liquor. On succeeding runs the amount of filter-aid can be gradually cut down until the minimum quantity which can be used successfully is determined. This will depend on the length of the filtration cycle obtained, the appearance of the liquor and the filter cake formation.

Filtration Procedure

An initial charge of the clear liquor containing a suspension of filter-aid is first mixed in the "precoating tank." Ordinarily an amount of liquor equivalent to twice the holding capacity of the press is used. An average of 10 to 15 pounds of filter-aid per 100 square feet of filter area is employed as a suspension in this charging liquor.

The charging liquor is then pumped through the press, depositing the filter-aid in a thin film over the entire surface of the filter cloths. (If desired, unfiltered or "raw" liquor may be used to carry the filter-aid suspension for the precoat). Generally the pre-coat charge flowing through the press is circulated back to the pre-coating tank until clarity of filtrate is obtained. This ordinarily takes from three to six minutes.

The main charge of liquor to be



Diagrammatic Cross-Section Through a Filter Cake

An Enlarged Sketch Illustrating the Manner in which a Filter-Aid Prevents Passage of Finely Divided Impurities Through the Filter Cloth.

1. THE FILTER CAKE. All the impurities suspended in the liquor being filtered are accumulated here. The cake is kept open by the filter-aid which is mixed with the charge liquor.

2. THE PRE-COAT. A thin film of filter-aid is deposited on the filter cloths by pre-coating. This thin film is open to the passage of clear liquors but positively impervious to all solid impurities. It serves to keep the main filter cake containing the impurities being removed from coming in direct contact with the filter cloth.

3. THE FILTER CLOTH. Its sole function is to support the filter cake. Slimes and gums do not reach it to clog the meshes and slow down filtration, or penetrate the cloth and cause cloudy filtrates.

There is an economic ratio between the given amount of filter-aid used for precoating and that mixed with the charge liquor in each filtration process. In many actual cases it has been possible to reduce the actual quantity of filter-aid used per unit of output by changing or manipulating the ratio of filter-aid used in the main liquor supply and that used for pre-coating. Longer filtration cycles and more rapid filtration are thus obtained, resulting in lower unit costs for pre-coating. This will depend to a great extent on the type of filter press used and the cost of removing and cleaning the cloths. In most clarification filtrations it is more economical to pre-coat than to remove cloths and to wash and replace them.

---

filtered is then pumped through as usual; the proper amount of filter-aid having been previously added and thoroughly mixed in the "mixing tank." In large cycle operation the filter-aid is generally added to the mixing tank continuously in proportion to the raw liquor being forced through the system.

The use of filter-aids does more than speed up filtration and insure clarity of filtrates. The pre-coating film protects the filter cloths from any gummy and slimy impurities in the liquor. The filter-aid mixed with the solids filtered out insures filter cakes that are firm and porous, easily washed and readily removed from the press. This results in a large saving of time and labor in cleaning presses, and greatly prolongs the life of the filter cloths.

Advantages of Filter-Aids

The benefits gained by using a filter-aid in any individual filtration process may be reflected in two ways:

1. An improvement is usually realized in the desirability and consequently the selling value, of the product manufactured with the assistance of a filter-aid over that of the product which has been filtered without a filter-aid.

2. A reduction in the total manufacturing cost is almost invariably effected.

The first advantage is readily apparent. The use of the proper type of filter-aid to insure brilliant clarity of filtrate helps greatly in producing and maintaining the highest quality of finished product.

(*Concluded on page* 352)

Oil Chemists to Meet in New York

Fall Meeting of Society to be Held at Chemists' Club October 28 and 29.

THE President and the Governing Committee of the American Oil Chemists' Society have deemed it advisable and for the best interests of the Society and of the industries and members, which are served by the Society, that a fall meeting be held each year in the Eastern or Middle Western part of the United States.

Therefore, the first Fall meeting of the Society will be held on October 28th and 29th, at the Chemists' Club, 52 East 41st Street, New York City.

The presence at this meeting of all members of the Society, and of all other chemists who are interested in fatty oils, soaps. and allied industries, will do much to encourage this commendable and progressive movement.

The American Oil Chemists' Society has a record of eighteen years of achievement, in developing and elevating the standards of Chemistry as applied to the Oil and Soap industries, and the Society deserves the support of all manufacturers and chemists in these lines.

Everyone with any interest in the chemistry of oils and fats, of soaps, glycerine and allied products, will be welcome at the meetings of the Society.

The meetings will be addressed by leading chemists in these lines of endeavor, including David Wesson of the Wesson Oil and Snowdrift Co., I. G. Priest of the U. S. Bureau of Standards, M. H. Ittner of Colgate and Company, Chas. H. Herty and others. The program follows:

Friday, October 28

Meeting called to Order at 10:00 A. M.

President's Address.

Secretary's Report.

Address: History of the Society; David Wesson.

Reports of Committees.

Address: The Co-operative Work of The American Oil Chemists' Society and The U. S. Bureau of Standards: I. G. Priest.

Committee Reports.

Address: M. H. Ittner.

Address: Hydrogenation of Oils: Carleton Ellis.

Address: Fish Oils: F. H. Meistnest.

Adjournment to 7:00 P. M.

Get-together Dinner at 7:00 P. M. at the Chemists' Club.

Address: Maximilian Toch.

Address: Chas. H. Herty.

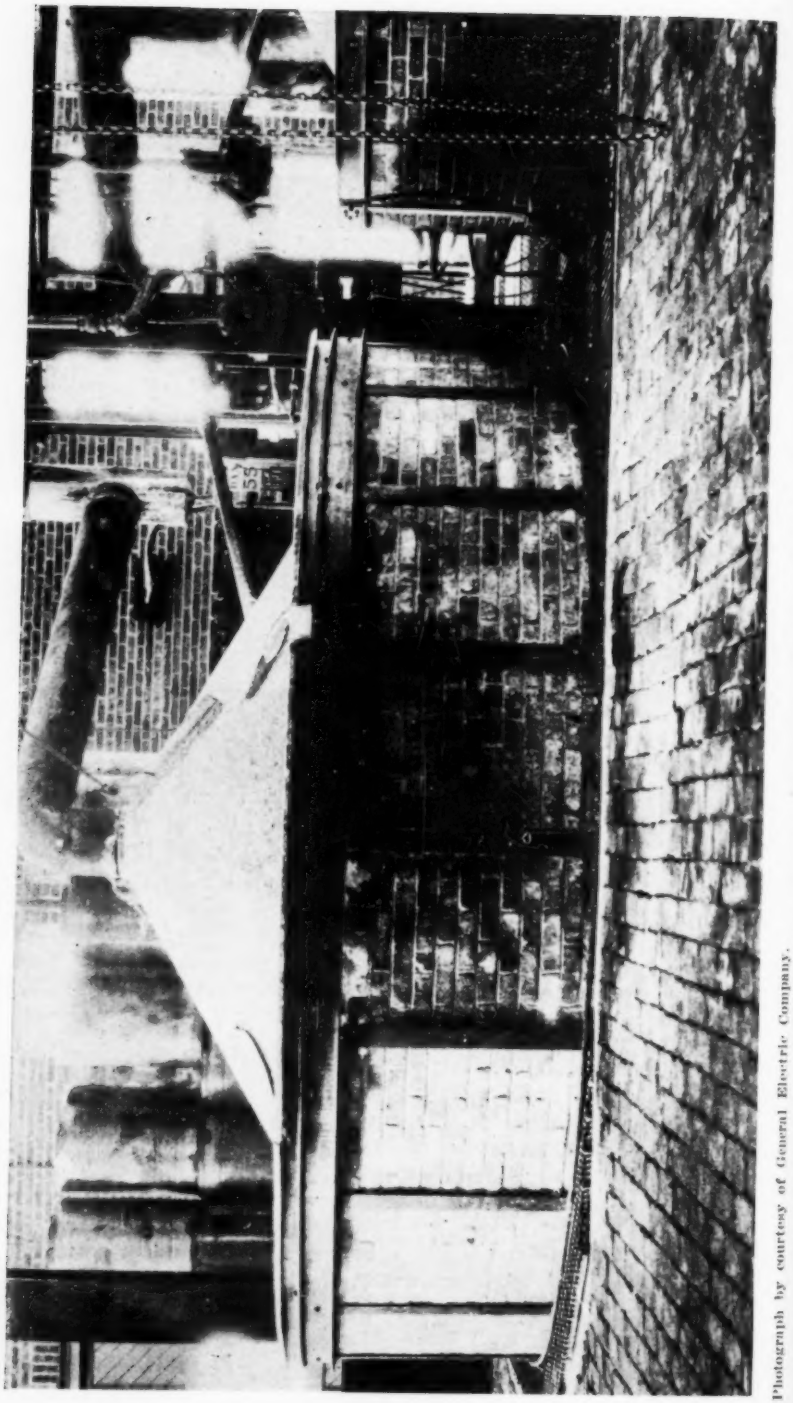
Committee and Group Meetings will be held at 2:00 P. M. October 28 and 10:00 A. M., October 29.

In addition to the dinner, social features will include trips to several neighboring plants in the industry and to various points of interest around the city. The New York members will act as guides for such trips as requested by visitors.

Ladies are especially invited to all the meetings and social functions.

There will be a meeting of the Fat Analysis Committee of The American Chemical Society and The American Oil Chemists' Society held on the same days as the Society meeting.

This committee is preparing the Standard Methods of oil and fat analysis for American Chemists.



Photograph by courtesy of General Electric Company.
Two electrically-heated fusing kettles for caustic soda, Riordan Pulp Corporation, Temiskaming, Quebec

Fusing Caustic Soda With Electric Heat

Manufacture of Oil and Soap Men's Basic Chemical by New Method Shows Important Economies.

By B. S. HAVENS

THE use of electric heat for fusing caustic soda on a commercial scale has been accomplished for the first time by the Riordon Pulp Corporation, of Temiskaming, Quebec.

Caustic Manufactured by Usual Electrolytic Process

Chlorine for use in making bleaching material is obtained by the electrolytic method, current being passed through a solution of sodium chloride. Chlorine is liberated at one electrode and, at the other, the liberated sodium combines with the water to form sodium hydroxide, which is then pumped to steam-heated evaporators. At this point, water is evaporated until the concentration is about 60% water and 40% caustic soda, by weight.

Electrically Heated Fusing Pots

The liquid is then pumped to the electrically heated pots in which it is fused. Each pot is approximately 10 feet in diameter inside and 6 feet deep and will hold approximately 2,600 imperial gallons. The pot is set in brick work consisting of 4½ inches of red brick outside, 9 inches of insulating brick and a 4½ inch fire brick wall inside, and is equipped with Canadian General Electric heating elements having a connected load of 500 kilowatts at 550 volts, 3 phase, there being two circuits of 250 kilowatts each. Automatic temperature control is provided by thermocouples, located in the chamber outside the pot, and there are four 250 kilowatts, 550 volts, 3 phase, Canadian General Electric control panels actuated by control pyrometers.

Concentration and Fusing Procedure

The caustic soda and water solution is pumped into the fusing pots continuously as fast as water is evaporated over a period of 50 hours, at which time the solution becomes sufficiently concentrated for fusing to take place. When the current is turned on at the cold fusing kettles, the temperature rises to 1200 degrees in from five to six hours. The temperature is maintained in the chamber outside the pot and, at 1200 degrees, the heat is conducted through the pot to the liquid as fast as it is generated. Thus the temperature outside the pot remains at about 1200 degrees during the first 40 hours of the operating cycle.

At the end of a 56-hour period from the start of the cycle, the 30,000 pounds of caustic in the pot reaches a temperature of approximately 800 degrees Fahrenheit and fuses into a water-free liquid state.

Savings Estimated

The Riordon Pulp Corporation, which operates the pots, has its own water power plant. Electricity is figured at 0.25 cents per kilowatt hour. Based on a production of 60 tons of caustic soda per week, requiring 1350 kilowatt hours per ton, the annual cost of electricity for the process is $10,400. For the same production using coal at $7.00 per ton and labor at $30 per week, the cost would be $21,200 per year.

Photograph by courtesy of General Electric Company.
Two electrically-heated fusing kettles for caustic soda, Riordon Pulp Corporation, Temiskaming, Quebec

The Wood Oil Trade in China

Manufacturing and Marketing Methods Susceptible to Improvement

MANY of China's industries owe their prosperity to foreign enterprise, without which her export trade would be much less than it is to-day. The assistance and advice given to Chinese farmers in the cultivation of tobacco have largely been the cause of the improvement of Chinese tobacco and a proportionate increase in her trade, both local and export. The same co-operation and improvement as regards wood oil have not yet materialised, although there is no reason why this should not be possible. Even without foreign assistance wood oil has become an important item of China's export trade, as the following table shows:

EXPORTS OF WOOD OIL FROM CHINA

Exported to:	1923. Piculs.	1923. Value.	1924. Piculs.	1924. Value.	1925. Piculs.	1925. Value.
Hongkong	107,825	1,343,127	73,948	1,026,406	29,030	407,650
Great Britain	48,731	1,076,848	53,404	1,063,424	38,587	736,608
Norway	755	16,573	1,291	25,459	675	13,164
Sweden	.....	.....	1,096	22,101	968	18,963
Denmark	2,173	48,354	4,177	84,350	2,623	52,267
Germany	65,032	1,440,041	79,283	1,590,299	63,470	1,233,761
Netherlands	5,134	113,501	7,969	160,234	10,407	203,944
Belgium	745	16,462	2,646	53,027	2,665	51,271
France	6,644	146,648	16,437	328,835	14,226	272,082
Italy	1,959	43,359	6,140	124,417	4,454	86,417
Japan	399	8,225	11,902	242,849	6,008	109,313
Canada	1,448	32,189	8,651	176,740	10,406	208,640
U.S.A.	593,624	13,162,949	627,040	12,774,698	706,093	13,970,761
Australasia	992	22,052	1,212	24,761	2,912	55,598
Total, includ. others	836,887	17,477,421	896,038	17,714,713	894,073	17,450,104

1 Picul=133⅓ lbs. 1 Haikwan Tael (all above values in Haikwan Taels)=1923, 79c. 1924, 85c. 1925, 80c.

NOTE.—Statistics taken from the Chinese Maritime Customs' returns.

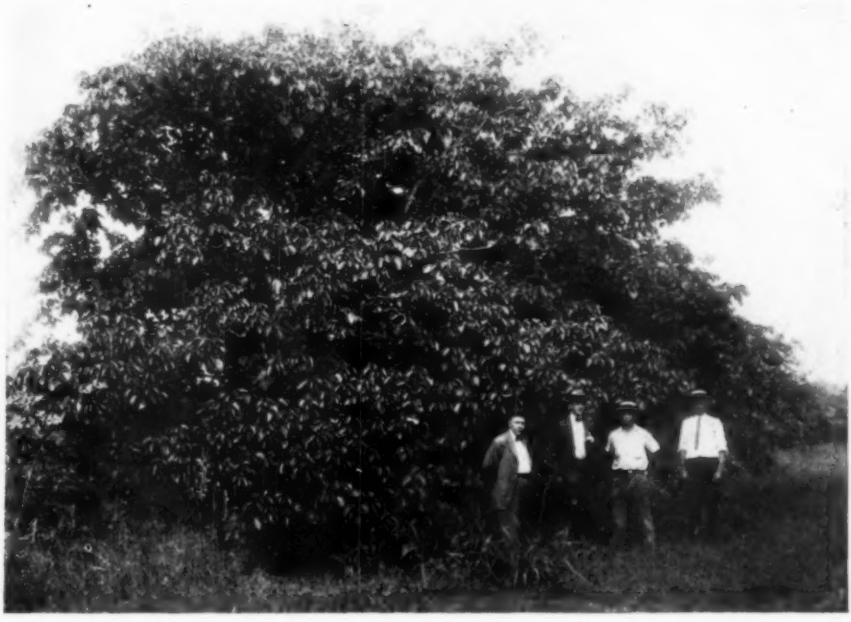
America Principal Market

According to recent news from Hankow, which is the centre of the wood oil trade in China, exports to America—the principal buyer of this commodity—of wood oil for the first half of this year have shown an increase of 5,000 tons over that of the previous year. This information is of particular interest, as it proves that, no matter how disturbed conditions may be in China—and Central and Western China have always been hotbeds of trouble—business continues even under difficulties. Buyers of wood oil have of late been somewhat anxious about adequate supplies and about the constant fluctuations in price, which has varied from 8 taels (a tael is to-day about 60c) to 29 or even 32 taels per picul (133 1/3 lb.). The conditions of crops and the demands of foreign markets contribute largely to this wide fluctuation in price seen in recent years. Imposition of internal and transit taxes ("likin") by Governors of various provinces in China where wood oil is produced, who require additional revenue wherewith to conduct their campaigns, are also causes.

Supply Is Ample

As to the question of adequate supplies and the cost of production of crude wood oil, China could pro-

duce more than sufficient to supply both her own needs and those of all other countries if only better and more up-to-date methods were known and practised in the cultivation of the "tungyu" tree, in the selection of seeds for cultivation, and were modern machinery employed for extracting the maximum of oil possible. There are numerous small native factories, each with its own equipment to produce oil, but the "machinery" used is extremely crude; drying on a brick structure ("k'ang"), grinding in a mill or grinding stone, steaming, wrapping, and then pressing and packing in barrels or tin containers (often empty kerosene tins), all these operations requiring little capital and not very much skill, as quality does not figure to the mind of the average Chinese of the same consequence as to the exporter and to the buyer. So far, the Chinese have not produced any uniformly high quality wood oil which can compare favorably with that produced from nuts grown in America. But there is no reason why this should not be possible with the aid of foreign guidance and instruction. As in the case of tobacco cultivation, American seeds might well be exported to China for the purpose of achieving this. These seeds could be distributed to farmers, advice given as to plantation, and the supplier undertaking to buy the whole crop at a reasonable price. The Chinese farmer is the most conservative of all classes in China, but he is open to conviction by results. Experimental plantations under foreign supervision would do much to convince the Chinese, and even help to sell foreign machinery for extracting the maximum of oil



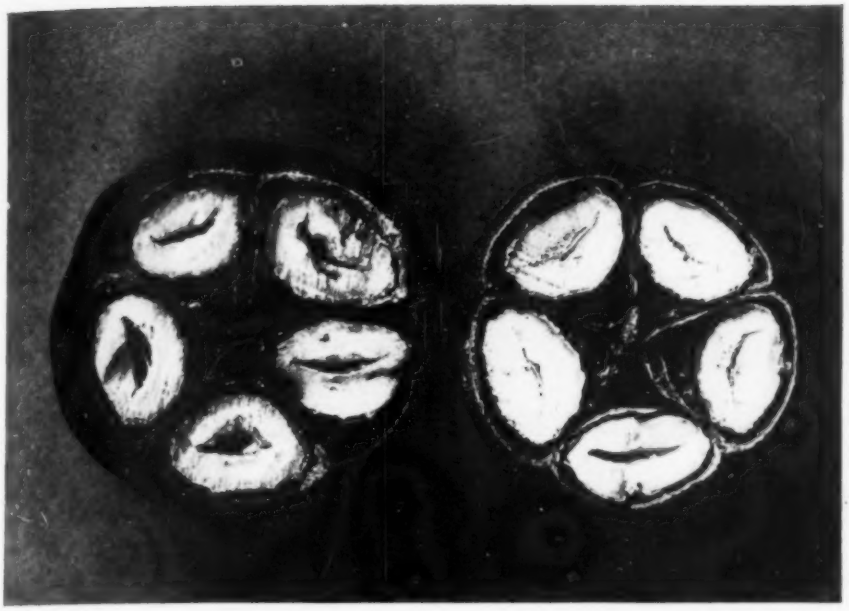
Tung oil tree in full bloom

possible. At present the Chinese obtain only about 19 per cent to 21 per cent of oil from the seeds, whereas with modern hydraulic presses 33 per cent to 38 per cent would be possible.

Many Go-Betweens

One of the difficulties of introducing better ways of production of wood oil in China is that of getting into close touch with the Chinese producer. At present there are too many intermediaries in this trade, and production is carried on on a very small scale by a host of small factories, each working with an outfit costing, perhaps, $50 to $100! These small "factories" sell their oil to oil shops or dealers, who bring it to the larger towns, where they sell it to brokers specialising in this commodity. These get into touch with the foreign exporters at Hankow, and sell to them on the basis of "spot cargo." As soon as a transaction for a certain quantity of wood oil is arranged between the foreign exporter and the Chinese dealer (generally through the medium of the "Compradore," sort of go-between, who is employed specially for the export side of every foreign business in China, another "Compradore" attending to the import part) the buyer has to make an advance payment ranging from 40 per cent to 60 per cent of the value, the balance being payable on delivery of the "spot cargo." This may take anything from a few days to a month to deliver. The "Compradore" receives a commission on each transaction, and is responsible for delivery, etc. Most firms buy spot cargo, and, although some "forward" business has been done in the past, it is generally considered safer to engage in the former. The problem of transportation is still a factor of some importance in the wood oil trade in China. But, with the increasing popularity of motor transport and

Mature Tung Oil Fruit



Cross section of tung oil fruit showing the seeds of nuts which contain the oil

its wider use, tne navigation of the Yangtsze River by more foreign steamers (this river passes through the centre of the wood oil producing areas), transportation facilities are bound to improve in the course of time. As political conditions become more settled (or, rather, more normal, since in China they are never quite "settled"), construction of railways will continue, and also help to improve means of communication.

Hankow Trade Center

At present there are twenty-three wood oil refineries in Hankow, seven British, eight German, four Japanese, two French, one American, and one Chinese. What is really required is a large foreign firm specialising in wood oil only, maintaining direct touch with the small Chinese manufacturers and growers, assisting and advising them how to produce the best results and obtain the maximum percentage of oil out of the seeds. These small Chinese producers and factors cannot afford to keep the nuts for any length of time before extracting oil. This is a disadvantage, as it has been found that, by keeping nuts from two to four months, a ton of nuts will yield three-quarters of a ton of oil instead of only half a ton when using fresh nuts. A large foreign firm established on the spot and maintaining close contact with the Chinese is certain to be a commercial success, and at the same time to benefit buyers abroad. It should, however, be always borne in mind that, in order to be able to get into direct touch and trade with small Chinese producers, one must win their confidence. The best and surest way to do this is by learning to speak the local dialect, discussing matters with them direct, and not merely through interpreters or

"compradores." Every foreigner living in China or intending to settle down there for any length of time should acquire at least a speaking knowledge of the dialect spoken in his district, and it is for the firm to insist upon this. Most of the difficulties (commercial, political, "military," etc.) which constantly arise in China (both among foreigners and Chinese) can be settled by means of discussions, by give-and-take, for compromise plays an important part among the Chinese, who are always open to friendly negotiations, but not to "lose face."—*Oil and Colour Trades Journal.*

(*Concluded from page* 344)

The cost of filtration operations is reduced by filter-aids in two ways. The increased capacity of the filter press equipment results from the higher rates of flow secured. This means that a larger quantity of finished product may be produced with a given size of equipment in a given time.

In many cases where filter-aid may now be used, the total filter-aid consumption can be reduced by employing the grade best suited to the individual problem at hand. In filtering sugar liquors, for instance, the total quantity of liquor put through each square foot during each cycle of filtration has been doubled in many cases by using a higher grade product.

In this work, "pre-coating," or coating the filter cloth with a thin film of filter-aid before each filtration cycle is started, is ordinarily employed. Lengthened cycles mean less precoat charges, so that the longer cycles secured by using the higher grades often reduce the total filter-aid consumption 25 to 35 per cent.

Rate of Flow

One of the controlling factors in filtration operations is the rate of flow. When a filter press is started on a new cycle this rate declines sooner or later to a point beyond which it is uneconomical to continue operation. The press is then opened up and cleaned in preparation for another cycle.

No marked falling off in the rate of flow over an extended period of time would be exhibited by a liquid with an absolutely free-filtering precipitate. In actual practice, however, the liquids which must be filtered exhibit a falling off in rate of flow as filtration proceeds and the filter cake builds up in thickness and resistance. The rate of decline in flow depends on the nature of the liquor and the amount and nature of solids present.

The purpose of using filter-aids is to make slow-filtering precipitates (or other solids to be removed) act more like free-filtering precipitates in the filter press, in addition to insuring highest possible clarity of finished filtrates.

A factor which directly effects rate of flow is the percentage of filter-aid used. For instance, it has been found in some cases that a slight increase in the percentage of filter-aid added not only increases rate of flow but also makes longer filtration cycles possible. The result in such cases is that the unit cost of filtration is decreased.

T. E. Cocker, who for six years was District Manager of the Chain Belt Company's Buffalo office is now in charge of their Cleveland office at East 200th Street and St. Clair Avenue.

The Recovery and Purification of Wool Fat

A Discussion of the Economic Possibility of an Important Raw Material

By H. WENNSTRÖM and C. P. HARRIS

RAW wool contains approximately between five and ten per-cent of wool fat. The first step in the treatment of the raw wool is the removal of these fatty constituents known collectively as Wool Fat, Wool Grease or Degras. For the accomplishment of this two radically different methods come under consideration.

Methods of Recovery

The first involves removal by means of solvent extraction, organic solvents, such as benzine, gasoline, trichlorethylene, etc., being employed.

The second method depends upon an extraction process with dilute soap solutions to which mildly alkaline substances are added, such as sodium carbonate or ammonia or both. In this case the constituents making up the wool fat do not go into an actual solution but form an intimate emulsion with the water rendered stable by the presence of the soap. From such liquids, after separation from the wool, the wool fat can be recovered by simple methods which may be of either a mechanical (physical) or a chemical nature or a combination of these. The separation can be brought about by heating to a certain temperature and allowing to settle by gravity, or it can be accelerated by employing a combination of heat and centrifugal force. It may be accomplished chemically by treatment with a suitable quantity of an acid, such as sulphuric, a product being obtained in this case which contains, in addition to the natural wool fat constituents, the fatty acids derived from the chemical decomposition of the soap employed, which free fatty acids, in turn, are removed at a later stage.

Of these two methods only this latter one seems to have come into extensive use, accordingly, it will be dealt with further in detail.

The raw wool, containing probably from 5 to 10 per cent. of fat constituents, is treated in large tanks with a weak aqueous solution of soap with the addition of soda ash, the tanks having suitable stirring devices so as to facilitate the detergent action on the raw wool. The wash waters are then pumped into other tanks or containers, and the separation of the wool fat brought about by raising the temperature to about 140 degrees F. and maintaining it at that point. The separation of the wool fat takes place in a period of time which may vary from one day to several weeks, this difference being due to difference in the nature of the wool fat contained in different kinds of wool. This separation can be greatly expedited by an employment of centrifugal force in conjunction with the heat treatment. Much work has been done on this line of late.

The essentials are: (a) Separation to be efficient for the lowest possible temperature, (b) The delivery of the separated wool fat must be continuous, (c) Separation must be equally efficient with any percentage of wool fat. The selection of the proper type of centri-

fugal for this work is of prime importance.

Proposals for Purification

The purification of wool fat can be accomplished by a combination of washing and treatment with chemical bleaching agents. Elimination of odor depends not so much on the actual removal of the odoriferous substances (butyric and caproic acids) as on their reduction, condensation or neutralization. For bleaching the wool fat sulphur dioxide appears to give the best results. Chlorine in a nascent state is good.

German Patent., D. R. P. 404 709 Kl. 23a Gr. 3 proposes a method for the treatment or purification of wool fat which consists of heating with water under pressure for several hours, followed by distillation, directly or with the aid of superheated steam, with or without the use of a vacuum. It has been found possible to recover the soap used in extraction of the wool fat from the raw wool (scouring).

It has been customary, to some extent, to accomplish this indirectly, chemically, using sulphuric acid to obtain the free fatty acids of the soap, then recombining these with caustic soda. It has, however, been found to be feasible to directly recover the soap as such, thus eliminating the expense of the sulphuric acid and the caustic soda. This is accomplished by a simple evaporation process. It is, possible, furthermore, in this method to increase the total yield of wool fat by removal of such as is still contained in the soap solution by solvent extraction, using benzine. The additional wool fat thus recovered would otherwise pass over into the fatty acids separated.

The advantage of an improved and rational method of wool fat extraction and recovery as outlined is: (1) A great reduction in the tank capacity required. (2) Reduction in the cost of steam by the shortening of time required. (3) Lessening of cost of material, sulphuric acid and caustic soda being dispensed with.

It is possible to combine extraction with soap solution and solvent extraction, the soap solutions containing the wool fat being extracted with benzine which takes up the wool fat, the spent soap being recovered as described above from the waters.

Methods have been proposed and utilized involving the conversion of the spent soap or the free fatty acids derived from the same, after the previous removal of the wool fat, into lime or other insoluble soaps, but this has not been found to be practicable from an economic standpoint.

Composition of Wool Fat

While the chemistry of wool fat by no means can be considered as settled, that is to say, as far as knowledge of all of the constituents of the material is concerned, it has been shown that a large portion consists of cholesterol compounds; partly free cholesterol, partly esters of cholesterol. The exact nature of the acids for the most part forming esters with a part of the cholesterol has not yet been clearly elucidated. Some of them are believed to be hydroxy acids. When wool fat is subjected to distillation under diminished pressure, a chemical decomposition takes place; the cholesterol portion giving rise to unsaturated hydrocarbons with two double bonds. Cholesterol itself is a secondary alcohol of an alicyclic structure with one double bond. The acid portion similarly undergoes a decomposition, the alpha hy-

droxy acids forming lactides on heating, the beta hydroxy acids, losing carbon dioxide and forming solid isomers of oleic acid, the gamma and delta acids forming lactones.

Further, there are present in wool fat two isomers of cholesterol which have been termed isocholesterol and metacholesterol. Ceryl alcohol and oleic acid are believed to be present in small quantity.

Cholesterol forms esters with acids, some of which possess characteristic properties and are of use in the isolation of cholesterol. Digitonin, a glucoside occurring in the seeds of the foxglove (Digitalis purpurea) has the remarkable property of forming a stable molecular compound with cholesterol, but does not form any compounds with its esters. This fact is interesting as it can be applied, even quantitatively, in differentiation between free or combined cholesterol, as it occurs in natural products, such as wool fat.

Possible Developments

By distillation under pressure, a process which can be applied to the crude grades of wool fat, it is possible to obtain a pure white paraffine-like product of a neutral reaction, consisting, presumably, of hydrocarbons, which may prove to be of value.

According to German Patent 326,933 addition to Patent 286,-244, a wax can be produced from the alkali soaps of wool fat by precipitation with an aqueous solution of a soluble magnesium salt. The precipitate is dissolved in boiling alcohol, the solution filtered off from any insoluble matter and allowed to cool, when a light colored crystalline magma of the wax products results. A further yield can be obtained from the filtrate by addition of water. It is feasible to obtain similar compounds using salts of iron, zinc, lead and other metals in place of magnesium.

The more or less crude grades of wool fat find use in the production of textile oils and in the preparation of lubricants. The more refined grades are utilized in the production of the so-called lanolin, largely used for pharmaceutical purposes and in the production of cosmetics.

The waste products and material too dark in color to lend itself to a process of purification can be utilized, the waste containing alkali salts and other mineral matter can be dried and ground into a fertilizer, the waste of oily or fatty nature might be utilized for the production of a fuel gas by destructive distillation.

Aside from its well known application in pharmacy as lanolin and the widespread use of degras in textile sizing, it is thus seen that waxes of value may be produced. Pyrogenetic decomposition may lead to commercial processes for the production of isomeric oleic acids, which in turn may be converted into paint driers by combination with metals to form salts similar to lead oleate. Saponification of the cholesterol esters may yield valuable fatty acids, which are as yet of doubtful constitution.

The application of chemistry to wool fat is a matter which requires reinvestigation. Most of the product today represents a waste of the wool industry, as with the exception of the highly refined lanolin the material is not of great value. The constituents of wool fat represent a potential source of valuable material, and the manufacturer who undertakes the development of processes for the separation and

(*Continued on page* 356)

Trade Conference of Edible Oil Industry

The Federal Trade Commission announces that it has approved plans for holding a trade practice conference of the edible oil industry with a view to bringing about elimination of alleged unfair trade practices. Seventy per cent of the representatives of this business have assured the commission of their desire to take part in such a gathering at an early date. No time for the conference has been set, but the commission has designated Commissioner J. F. Nugent to represent it at the meeting.

As stated in a recent Information Letter, methods of packing salad dressings made from olive oil and cottonseed oil will be discussed. It is said there are differences of opinion as to what constitutes the weight of a gallon of oil, and in an effort to obtain expert advice on this subject the industry has approved plans to invite to the conference specialists from the Department of Agriculture and the Bureau of Standards. It is asserted that a gallon of salad oil varies both in weight and volume with the degree of temperature at the time of packing and that consequently packers have had difficulty in maintaining accurate measurements. These conditions have brought on confusion and prominent members of the industry express the hope that a standard weight will be established at a trade practice conference.

Sale of cottonseed oil for pure olive oil salad dressing is another practice said to exist at times and it will be taken up at the conference.

This meeting will undoubtedly draw a large attendance of oil refiners, brokers, and dealers.

(*Continued from page* 355)

sale of the several substances present should be well rewarded for his efforts.

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Determination of Neutral Fat in Soaps

A New Rapid Method Suitable for Control Laboratories.

By L. F. HOYT

UNSAPONIFIED - saponifiable matter in soap includes free fatty acid if present and any neutral fat. In the case of a thoroughly uniform soap which contains free alkali, the unsaponified saponifiable matter would consist wholly of neutral fat, often referred to as "free fat."

The determination of neutral fat in soap by such standard methods as those of the Bureau of Standards (Circular 62, 3rd ed. of 1923, page 23, section (e), or of the American Chemical Society (J. Ind. Eng. Chem. Vol. 14, 1159 (1922)) involves a wet extraction process which is very tedious and requires a large amount of personal attention by a skilled analyst.

Both of the above standard methods provide for the correction of any free fatty acid contained in the unsaponified-saponifiable matter by titration and deduction of the amount found.

(Note: An extraction method is faulty which makes no provision for the correction of free fatty acid that is invariably contained, in the author's experience, in the unsaponified-unsaponifiable residue obtained by the wet extraction of soap solutions by ethyl ether. Analyses of soaps containing no free fatty acid whatever, made in this laboratory by wet extraction methods, have repeatedly yielded ether extracts in which the free fatty acid (calculated as oleic acid) amounted to 0.4 to 0.6 per cent, and even higher, of the weight of sample taken.)

It should be pointed out, however, that this correction cannot be made with strict and certain accuracy since the molecular weight of the free fatty acids involved is not known. Free fatty acids are ordinarily computed as oleic acid, but for example, in the extraction of a soap high in coconut oil the mixed free fatty acids obtained along with the neutral fat and unsaponifiable might have a mean molecular weight quite different from that of oleic acid. Furthermore, the residue containing an unknown amount of true unsaponifiable matter must be saponified and re-extracted to obtain the amount of unsaponifiable before the per cent of neutral fat can be computed.

Rapid Method of Determining Natural Fat in Soap

The following method for the determination of neutral fat in soap involves no new principles and is merely an adaptation of the method for determining saponification number.

Directions:—Weigh a sample of soap of from 10 to 15 grams (depending on moisture content) to 0.1 gram. Dissolve in 150-200 cc of hot neutral alcohol (94% or higher). If the alcoholic solution is not entirely clear and free from alcohol-insoluble matter, filter with suction through a Gooch crucible, protecting the solution from carbon dioxide or other acid fumes and wash the crucible with hot neutral alcohol until free from soap. Unless the resulting alcoholic soap

solution is neutral to phenolphthalein indicator, add just enough aqueous alkali or acid as required, to neutralize any free acidity or free alkali in the soap. To the neutral alcoholic soap solution, add 10 cc alcoholic KOH (40 grams per liter in aldehyde-free 94% alcohol) accurately measured with a pipette or burette. Attach to a reflux condenser and boil for 30 minutes. Run a blank in the same manner with 150 cc neutral alcohol and 10 cc alcoholic KOH accurately measured, boiling under reflux as with the sample. While still hot titrate both blank and sample with N/2 aqueous acid. From the number of cc of alcoholic potash absorbed calculate* the per cent of neutral fat in the sample.

$$\frac{\text{cc N/2 Alkali Consumed} \times 28.05}{\text{Saponification Number (mgs KOH)}} \times \frac{100}{\text{Wt. Sample (in grams)}} = \% \text{ Neutral Fat}$$

This method is particularly valuable for the rapid routine control of cold made soaps such as shaving soap, vegetable oil soaps, soap base for liquid soaps and the like, but can be applied equally well to boiled soaps.

It can also be applied with a fair degree of accuracy to soaps of unknown fat composition after obtaining the proper saponification number by either (1) or (2) as follows:

(1) Separate the fatty acids from a portion of the sample and determine their neutralization value, expressed as milligrams KOH per gram. Neutralization Value of Fatty Acids x 0.97 = Saponification Number (approx.) of neutral fat from which they were derived.

(2) Unless the sample contains a considerable proportion of such oils as coconut oil (avg. Sapon. No. 257) or of castor oil (avg. Sap. No. 181) its fat stock will probably have a mean saponification number of 195 to 200 and assumption of a value of 200 will usually yield results accurate within the limit of experimental error.

* This method was worked out for control purposes on soaps whose fat stock and whose saponification number were known.

Comparison of Methods for Determination of Neutral Fat in Soap

Standard A.C.S. Method	*Rapid Control Method*
Weigh sample, 5 grams	Weigh Sample 10 grams.
Dissolve in 100 cc hot 50% alcohol	Dissolve in 150-200 cc hot neutral 94% alcohol.
	Filter with suction, if not free from carbonates and other fillers.
If acid, neutralize with aqueous alkali.	If acid, or alkaline, titrate until neutral.
Evaporate bulk of alcohol.	
Redissolve in 200 cc hot water; transfer to separatory funnel, cool and carry out a complicated extraction process with ethyl ether, using 3 separatory funnels and repeated washings of ether extracts.	(no extraction, no evaporation)
Filter ether extract, evaporate and weigh (1).	

Dissolve residue in neutral alcohol and neutralize with standard alkali (3).	
Deduct free fatty acid found by titration (3). Residue is neutral fat plus unsaponifiable (3).	
Thoroughly saponify residue with alcoholic potash.	Thoroughly saponify with known excess of alcoholic potash.
Repeat the foregoing procedure.	Titrate excess of alkali with standard acid and from amount of alkali absorbed by sample calculate the % neutral fat in sample.
Weigh the residue of unsaponifiable matter (4).	
Neutral Fat in sample = (4)—(3).	
Summary:—	
5 Weighings.	1 Weighing.
1 Titration (2 if originally acid).	2 Titrations (or 1 if soap is neutral).
Complicated extraction procedure.	1 Titration of blank.
Considerable skilled attention required.	Minimum amount of attention.
Total elapsed time for analysis 3 hours or more.	Total elapsed time for analysis 1 hour or less.

By the rapid control method above described neutral fat in soap may be determined in an hour or less with an accuracy of about 0.05%, using a 10 gram sample and making titrations with N/2 acid.

Codliver Oil Equals Sun's Rays Effects

Experiments on albino rats by a group of Massachusetts chemists showed that codliver oil is more generally applicable in the treatment of rickets, which afflict children, than ultra violet light, which is a substitute for the sun, according to a report to the Division of Medicinal Products of the American Chemical society.

One group of rats was treated for fifteen minutes daily with ultra-violet light of known intensity, said the report presented by Dr. Arthur D. Holmes, director of the Patch Reserve Laboratory Boston, and his assistant, Miss Madaleine G. Pigott; and Dr. Edwin T. Wyman, associate professor of pediatrics, and Dr. Lawrence W. Smith, instructor in pathology, Harvard Medical School. Similar groups of rats during the same period were fed codliver oil in amounts varying from one-fifth of a drop to one drop daily.

The investigators determined the effect of the ultra-violet light treatment and the codliver oil feeding by their effect on the animal's body weight, the calcium and phosphorous content of their blood, X-ray pictures of the bones, by a pathological examination of the bones, and by their mineral content.

Judged by these five diagnostic features, it appeared that one-fifth to one-half of a drop daily of the oil was as effective in protecting the animals against rickets as ultra-violet treatment for fifteen minutes daily at a distance of three feet.

—*Drug Markets.*

The American Oil Chemists' Society

Notes and Correspondence

Report of the Planning Committee

Your Planning Committee found that when they took office at the beginning of the year much of the work of the various committees had been planned for the coming season. Some of these plans were due to unfinished programs and other plans by direct instructions from the Society as a whole. Your committee, therefore, felt that it was not best to interfere in any way with the plans of these committees, but to study the situation during the year and make such recommendations for the 1927-28 season as their studies seemed to justify.

Some of our committees have been active practically since the birth of this Society. There are other committees which have been active in the past but have ceased to function in the past few years. We believe that in some cases this was not the best plan to follow even though methods had been standardized to a satisfactory point.

To illustrate, we will take the Ammonia Committee. In the early days of the Society, this committee worked on the various methods for the determination of nitrogen in cottenseed products. They developed a method which, for accuracy and checking, we all feel proud of. This committee, then, was followed up by the Check Meal or Smalley Foundation Committee. Active research work in the ammonia field has not been prosecuted for a number of years. We believe that the method as now standardized and set forth in our rules should not be tampered with. We do believe, however, that there should be an Ammonia Committee to follow up other phases of ammonia determinations. For instance, there are a number of nitrogenous or ammonia chemicals on the market, the prices of which are about a quarter of that of ammonia in cotton seed meal per unit. Our present method would report the total ammonia without detecting these other ammoniates which might be present either by accident or more likely by unscrupulous admixture. We believe, therefore, that an Ammonia Committee should be appointed to investigate methods for the detection of ammoniates foreign to cottonseed. This commitee should take a broad view and should keep well abreast of all information relating to ammoniates either in edible meals or fertilizers, and pass this on by published articles from time to time or by formal report. We would, therefore, recommend that the Smalley Foundation Committee be a distinct committee for the carrying on of the Check Meal work and that another committee be formed to investigate the phases of the ammonia problem outlined above.

Another point which we believe should be considered by the incoming administration, and that is the grouping of committees of one general character under a single head. To illustrate this, we believe there should be a general chairman for color investigations. Under this chairman, there should be sub-committees to investigate the various phases of the color problem which

we have and will continue to have before us. One sub-committee should study the direct reading of colors of oils and determine just how these should be handled. This committee should be in close liaison with the Refining Committee. Other committees on standardization, other sources or substitutes for standard glasses, etc.

We further think that in the refining of oil, etc., the Neutral Oil Committee, as we had this year, should be a sub-committee of the Refining Committee or else be in much closer connection with the work of the Refining Committee, at least to the extent of working on the same samples, so that better comparison of methods might be made and for the proper interpretation of results.

We also suggest, where possible, the personnel of the committees should be so selected that they can get together once or twice during the season. Nothing, in our opinion, furthers the work as much as a chance to talk things over together and, if necessary, have a laboratory demonstration. Geographical proximity of committee members will help in this respect.

To summarize, we recommend as follows:

Refining Committee

General Chairman

Sub-committee to follow up the work the past year and along the same general lines. Sub-committee to investigate "neutral oil methods" for evaluation of crude cottonseed oil. The question of F.F.A. should be handled under this general chairman.

Seed Committee

To co-operate with or as part of an Interstate Committee. This committee should follow the general lines now being investigated. Data especially are needed showing the relation of laboratory results versus mill out turn.

Color Committee

General Chairman

Sub-committee on preparation of refined oils for color reading. Intensive research on the influence of all the various factors and strict and narrow standards evolved if possible. This committee to be in close liaison with the Refining Committee.

Sub-committee on colorimeter and standardization of members' glasses, etc.

Sub-committee on other sources of satisfactory substitutes for Lovibond glasses of same color values.

Detergents Committee

The program of this committee is well worked out and published for considerable time ahead.

Moisture Committee

We recommend this committee be continued and some means be devised by check samples or otherwise to convince certain members that their apparatus is faulty. Failing this, a single standard method and apparatus should be required of all.

Analysis of Commercial Oils and Fats

The work of this committee is up-to-date and the revised methods recently printed. No specific recommendation as to methods is suggested. Possibly some work could be done to increase the number of Produce Exchanges and other commercial bodies to formally adopt the methods.

Cake Color Committee

The work of this committee should be continued and the method

further refined as experience is gained.

Ammonia Committee

To investigate means of detecting possible adulterations in cottonseed as affecting the protein value. Give annually a general chemical survey of this field.

Committees, such as the Smalley Foundation, Basic Research, etc., we do not regard as coming within the scope of this committee.

J. J. VOLLERTSEN,
W. D. HUTCHINS,
A. W. PUTLAND,
N. C. HAMNER,
H. J. MORRISON, *Chairman.*

Uniform Methods Committee Report

While the Uniform Methods Committee held no meetings prior to our arrival in Memphis, several matters were referred to us and considered by correspondence.

The Report of Committee on Determination of Free Fatty Acid of Oil in Seed.

The Method developed by that Committee was approved and recommended to the Chemist Committee for adoption.

Report of Committee to Develop a Method for color of Cotton Seed Meal and Cake.

Having before us a definite statement that method (2) had been decided upon by the Committee as the most satisfactory for comparison in situ. The adoption of this part of the method was approved and recommended to the Chemist Committee for adoption.

It is now further recommended that a definite degree of fineness be specified, and that the Chemist Committee request the Rules Committee of the Interstate that it be made a part of Rules 91 and 102.

If a machine is to be employed to make color comparisons, specifications for such machine should be made a part of the method.

Report of Moisture Committee

As this Committee recommends a further study of the Kingman distillation Method, your Committee does not believe that it would be advisable to make a change until definite conclusions have been reached by the Moisture Committee as to the advisability of adopting a Modified Kingman Distillation Method.

Report of the Refining Methods Committee

As this report was thoroughly discussed in an open meeting of the Chemist Committee of the Interstate, the Uniform Methods Committee simply wish to urge that definite specification for a direct-drive Refining Machine be made a part of the Method and further recommends that a Committee be appointed to secure the construction of such machine that it will be available at the beginning of the coming season.

BATTLE,
CAMPBELL,
HAMNER,
PUTLAND,
PAQUIN, *Chairman.*

Report of Refining Test Committee 1926-27

The recommendations of last year's committee were carried out and other points studied. The principal items in this year's work were as follows:

A. Size and shape of paddles.
B. Co-operative work on F.F.A.
C. Variable conditions and ef-

fect of same on present refining method.

D. Revised present lye tables.

E. Meeting of committee at Ivorydale in January.

F. Co-operative samples for refining tests.

G. Rewrite the entire refining method.

A. Paddles

This confirmed work by previous committees in 1915 to 1916 and 1921 and 1922 showing that straight blade paddles are best. A width of one inch was found much better than the present one-half inch width.

B. F. F. A. Cooperative Work

This was undertaken because errors in this test may have an important bearing on the choice of lye for refining and on the actual refining results. Results and conclusions will be published about August 1st, after all results from the tenth sample are tabulated.

C. Variable Conditions in Refining

This has been the most important part of the work this year. The Proctor and Gamble Company gave the entire time of a research chemist for six months to study those conditions and the effects of same on refining results. The principal results of this work have been published in the JOURNAL OF OIL & FAT INDUSTRY for November and December, 1926. They show that certain points which have previously been subject to modification at the discretion of individual operators may have a very decided effect on the refining results. The optimum conditions have been determined and specified in detail in the revised method. Tentative specifications for a standard refining machine have been prepared.

D. Revised Lye Tables

Errors in the lye tables previously used have been corrected. The maximum NaOH specified for oils of high F.F.A. has been increased.

E. Meeting of Committee, January 14 and 15

All members of the committee were present at Ivorydale on these two days and had a thorough discussion of all points developed under "C," and planned further work. Also all members witnessed demonstration of the revised procedure. All are agreed that this meeting was one of the most valuable features of the year's work. More can be accomplished in one day under these conditions than in months of ordinary correspondence.

F. Cooperative Refining Samples

Five samples were sent out. The loss and color in general differed but little from the average results by the present official method, but are if anything better in both respects. The main point established however, is that results by the revised method are much more concordant than heretofore obtained by the present method. The last of these samples was sent to all refining chemists who answered a circular letter signifying their willingness to co-operate. Reports were

	Revised Method			Present Official	
	F.F.A.	Loss	Color	Loss	Color
Average ..	9.07	22.9%	19.3 R.	24.6%	20.2 R*
Max.	9.25	23.8	20.6	28.9	37.5*
Min.	8.8	21.8	16.0	18.9	15.1

*Omitting from table one color reading reported to be "over 50 red" by official method.

received from eight chemists with the following summary of results.

Six out of eight operators report losses by the revised method checking within .8%, while the best six out of eight reports on the official method check only within 3.8% thus showing the superiority of agreement, even on a bad quality oil, by the revised method in the hands of different operators working in different laboratories.

G. Rewrite Method for Refining

The method has been completely rewritten endeavoring to specify every required condition and to leave no discretion to the operator. The conditions thus specified are those which have been found to give the best refining results. Details of the method were published in OIL & FAT IUDUSTRIES for February, 1927.

Summary and Recommendations

We have developed the necessary conditions for obtaining standard refining results and have shown that different operators can get almost identical results by following the procedure as described even on oil with high F.F.A. This is a great step forward over co-operative work of previous years. Furthermore, we feel that if six out of eight operators can get almost identical results the other two should also be able to do the same, and after all operators have obtained sufficient experience with the revised procedure, we believe there should be no excuse for any one being out of line with the others.

Differences in color readings on oils from co-operative refinings are much less when read by the same individual than when read by individual operators in different laboratories. This latter discrepancy cannot be due to differences in refining, but we believe it more of a problem for the committee on color readings to handle.

We recommend that the revised procedure be adopted for regular use during the coming season.

We recommend for next year's committee the following:

1. Develop exact specifications for a standard refining machine and other apparatus to assure absolute uniformity.

2. Keep in touch with refining chemists in all sections of the country to see if the specified conditions in the revised procedure work satisfactorily on oil from all sections. Also endeavor to adjust any differences which may arise among different chemists and determine the causes of such differences in results.

3. Study especially the effect of the limited choice of lye as now prescribed, to see if any modifications should be made.

4. Send out a few co-operative samples for F.F.A. and refining tests. All referee and refining chemists should participate in this work.

5. Develop similar refining procedures for other oils than cotton seed.

C. B. CLUFF,
Chairman.

Additional Committees

President Trevithick, of the American Oil Chemists' Society announces the appointment of the following committees:

Planning Committee:
H. J. Morrison, Representing Soap Interests, Chairman, c/o Procter & Gamble Co., Cincinnati, O.

A. H. Gill, Representing Miscellaneous Oils
B. H. Thurman, Representing Linseed Oil Interests
H. Aspegren, Representing Cotton Oil Interests
J. J. Vollertsen, Representing Animal Oil and Packing House Interests
A. W. Putland, Vice President.
H. P. Trevithick, Ex-officio.

Olive Oil Committee:
L. M. Roeg, Chairman, 72 Salisbury St., Worcester, Mass.
G. S. Jamieson,
C. V. Bacon,
M. F. Lauro,
W. H. Dickhart.

Metallic Extraction Thimbles

During several years work with the well known type of refractory extraction thimbles, the writer became impressed with the desirability of a non-breakable thimble for ether extraction work. While the refractory thimbles are very satisfactory in many ways, the loss by breakage and wear is quite appreciable where a large volume of work is being done.

After some investigation our attention was called to Monel Metal Filter Fabric. This comes in two grades, one is simply woven, and the other first woven and then rolled. This latter forms a fairly rigid sheet, with very fine perforations, is easily soldered, and fairly non-corrodible.

Of this material the writer made a number of cylinders, two centimeters in diameter and nine centimeters long, all free cut edges being also soldered to prevent unraveling. These have now been used in place of the refractory thimbles for several months with satisfactory results. They cost less than the refractory clay thimbles, are practically non-breakable, and if they become clogged through long usage, can be cleaned by boiling in chemical solutions or unsoldered and ignited.

Jos. D. Enas, Chemist.
El Dorado Oil Works, Berkeley, Cal.

Uses of Olive Oil in Fish Canning

A trade note from American Commercial Attache Charles H. Cunningham, at Madrid, Spain, dated July 2, states that considerable criticism is expressed in various journals and dailies over the alleged crisis occurring in the fish canning industry, due to the fact that the law compels the use of only pure olive oil for this purpose. The canners claim that as a result they are not able to compete with the foreign producers who are allowed to use perfectly wholesome oils consisting of mixtures of the extracts of other seeds with olive oil. With the existing high price of olive oil, the producers say that they cannot hold their present position in the world market. They point to the fact that the Royal Decree of April 23 of this year, permitting the importation of 25,000 tons of seed oils, had no effect on price of olive oil. The canners further state that this importation was very small and not sufficient in any way to remedy the condition in which they find themselves. They propose a more liberal importation of cheaper oils of other seeds by means of individual permits and collective grants to associations of producers, the law to provide for the automatic cessation of such import whenever the price of olive oil descends to a reasonable level.

List of Referee Chemists

THE following is the Official list of names and addresses of Referee Chemists who are members of both the Interstate Cottonseed Crushers' Association and The American Oil Chemists' Society, as forwarded to OIL & FAT INDUSTRIES by Mr. H. P. Trevithick, President of the latter society.

ALABAMA	Birmingham	Picard Laboratories D. C. Picard, Pres.	Clark Bldg., Box 1231
	Montgomery	The Battle Laboratories H. P. Battle, Pres.	103 South Court St.
ARKANSAS	Little Rock	Barrow-Agee Laboratories, Inc.	
CALIFORNIA	Los Angeles	Geo. W. Gooch & Co.	218 S. Broadway
	San Francisco	Curtis & Tompkins	331 California St.
GEORGIA	Atlanta	Law & Co. Thos. C. Law	16 Baker St., N. E.
	Savannah	Shuey & Co., Inc.	115 E. Bay St.
LOUISIANA	New Orleans	J. C. P. Helm	705 Tchoupitoulas St.
	New Orleans	Edw. G. Williams	Title Guaranty Bldg.
	Shreveport	Barrow-Agee Laboratories, Inc.	
MARYLAND	Baltimore	Wiley & Co.	904 N. Calvert St.
MISSISSIPPI	Jackson	Barrow-Agee Laboratories, Inc.	
	Meridian	Nahum E. Katz	P. O. Box 243
NEW YORK	New York	Bureau of Chemistry H. P. Trevithick	Produce Exchange Bldg.
OKLAHOMA	Oklahoma City	S. Lomanitz	234 Terminal Arcade Bldg.
S. CAROLINA	Columbia	Chas. W. Rice & Co.	Merchants Bank Bldg.
TENNESSEE	Memphis	Barrow-Agee Laboratories, Inc.	P. O. Box 1056
	Memphis	L. B. Forbes Laboratories	P. O. Box 792
	Memphis	Johnson Laboratories Lehman Johnson, Pres.	27 Vance Ave.
TEXAS	Dallas	Landon C. Moore, Inc. Landon C. Moore, Pres.	1713 Young St.
	Dallas	Southwestern Laboratories N. C. Hamner, Pres.	1812½ Main St.
	Fort Worth	Fort Worth Laboratories Porter & Fash	828½ Monroe St.
	Galveston	Felix Paquin	Hall Bldg.
	Houston	Houston Laboratories F. R. Robertson	215½ Main St.
WASHINGTON	Seattle	Laucks Laboratories, Inc.	314 Maritime Bldg.
INDIANA	Hammond	Indiana Laboratories	

Luther H. Bosnian has been appointed Superintendent of the Park Street Plant of the Chain Belt Company, Milwaukee Manufacturers of REX Conveyors, Travelling Water Screens, Chain and Concrete Mixers. Mr. Bosnian is a graduate of the Sheffield Scientific School, Yale University, and has been connected with the Chain Belt Company's Production Department for the past eight years. Previous to this he was with the Westinghouse Electric and Manufacturing Company and came to the Chain Belt Company in 1919 as a time study man.

MR. A. A. JACKSON has announced his resignation, on October 18, as Vice President of Darco Sales Corporation, with which he has been associated since its organization in May, 1922. Mr. Jackson has not yet made any definite decision as to his future activities. For the present his address is 140 Claremont Avenue, New York City.

WANTED: Young man, to assist superintendent in vegetable oil refinery. Experience in coconut oil essential, in other oils desirable. Graduate chemist preferred. Good salary and advancement. Apply Box F. G. 234, c/o Editor OIL & FAT INDUSTRIES, 220 W. 42nd st., New York City.

Abstracts from Other Journals

DAVID WESSON, *Abstract Editor*

Fat Splitting Catalysers

Comparisons were made concerning the reactivity of the new German fat splitting catalyst "Idrapidspalter," which consists of a sulphonated anthracene derivative—octohydro anthracene sulphonic acid—with American and Russian "Contact" catalysers, which are formed in the purification of mineral oil distillates by treatment with concentrated or fuming sulphuric acid. The latter are mainly sulphonated poly methylene hydrocarbons. The American products have a higher molecular weight than the Russian. The American products contain about 33 per cent of mineral unsaponifiable matter as against 17 per cent for the Russian and 7 per cent for "Idrapidspalter." The American and Russian products contain about 45 per cent sulphonic acids, whereas the German approximately double this value. The results of all hydrolyses with these three catalysts showed that the cleavage with "Idrapidspalter" under conditions observed in practice took place more slowly than with the Russian "Contact R" or the American "Contact D and DR." The latter two materials caused a marked coloration of the fatty acids and much emulsion formation.—Petroff, Dimakoff and Taksa (Translated from the Russian, Seifensieder, March 24 and 31, pp. 221-222 and 241-242, 1927).

The Value of Laboratory Tests on Lubricating Oils

Research into the practical meaning of the common laboratory tests for lubricating oils demonstrates that (1) there is no substantial benefit to be derived from compounding the oil to improve its "oiliness"; (2) although the formation of decomposition products in service is undoubtedly an important factor in lubricating oil quality, the laboratory tests at present do not evaluate that factor correctly; (3 no justification is apparent for the judging of oil by viscosity changes above 70°C.—Marshall and Barton (Jour. Soc. Chem. Industry, April 8, 1927. pp. 130T to 138T).

Karité Butter

Karité nuts or almonds found in French colonies in central Africa have been studied practically to determine methods of production of karité oil or butter which the nuts contain in amounts up to 50 per cent. Simple washing of the pulp with water and drying the resulting product in the sun are recommended as giving the best results. Fermentation is not desired in this material as the nitrogenous content is increased. Shipment of the nuts thus obtained presents no difficulty and makes it possible to obtain in European refineries a quality of butter superior in quality to that given by roasting or fermenting previously. Manufacture of the butter on the spot is being carried out in rudimentary apparatus consisting of grinding mills and hydraulic presses.—M. P. Ammann (Bull. de Matières Grasses, 1927, no. 1. pp. 20-36).

The Necessity of Drying Oil Seeds

By drying Flax seeds at 130-150 degrees with a corresponding reduction in water content to 1½-2½ per cent, the amount of oil cake is reduced about 1 per cent. The seed may also be ground more finely in the mill. If the drying is carried out quickly enough a drying of the oil in the seeds need not be feared.—A. Lobaschow. (Masloboino Shirowoje Djelo, 1926, No. 1. 42-46, and Chem. Zentralblatt).

Solidification Points of Edible Fats

Solidification point curves for butter fat, oleomargarine, coconut oil, palm nut oil, hardened arachis oil, lard, and others were made. The greatest softening by Mohr's method was found to be ±10.2 per cent with an average of ±0.1 per cent. Good margarines show similar solidification curves to that for butter fat.—T. Meyer (Zeitschr. Unters. Lebensmittel *52*, 461-65).

The Chemistry of Palm Oil

The principal odoriferous constituent of palm oil is suggested as being an oxidation product of the carotin present. The crude oil during preparation and storage undergoes enzymatic hydrolysis, the more unsaturated glycerides being attacked first. Only palmitic and oleic acids were detected in appreciable quantity and the presence of more unsaturated acids than the latter is doubtful. Palmito-distearin was found in hardened palm oil. Tripalmitin was prepared from the neutral oil, the total amount of which is about 10%. The presence of triolein, oleo-dipalmitin and dioleo-palmitin was demonstrated.—W. Brash (J. Soc. Chem. Ind. *45*, 438T.)

Investigation of Drying Oil Films

Films of linseed and poppyseed oils dried in ultra-violet light, i. e., direct sunlight, showed a loss of weight following the first sharp increase due to oxidation. Paints made with these oils as vehicles showed this effect in exaggerated form, the weight of the films after twenty days' exposure being considerably less than at the outset. The normally dried film is supposed to consist of glycerides of oxy-acids but this cannot be substantiated by chemical investigations. Neither reduction with usual reducing agents, nor acetylation will yield products which may be identified but simply tars which cannot be handled. The oxidized films are condensation products of the intermediately formed peroxides and are not true oxy-glycerides.—A. Eibner and H. Mumzert (Chemische Umschau., April 13, 1927. pp. 101-108).

Palm Oil

Clayey, hard packed soils exert a deleterious influence upon the growth of oil palms. Soft soils rich in humus are most favorable. Five or six years ago the yield of oil was 22 per cent of the weight of the fruit. The yields have mounted progressively to 24 and 25 per cent and today 27 per cent is obtained. The new method of extracting with benzine will permit the works in a very short time to extract 29 to 30 per cent of the weight of the fruit. Due to sterilization procedure recently introduced, the acid content of the oil has dropped from 12-15% to 5-6%.—M. Ferrand (Bull. de Matières Grasses, de L'Inst. Col. de Marseille, No. 1. 1927. pp. 3-13).

New Way Developed for Testing Flaxseed

Oil Content Determined in 15 Minutes, Says Agriculture Department

A simple, rapid method for determining oil content of flaxseed has just been developed by the Chemical Research Laboratory of the Bureau of Agricultural Economics, Department of Agriculture, according to an announcement of a new bulletin dealing with oil content of flaxseed and with the production and consumption of flaxseed. The full text of the announcement follows:

A simple method for testing flaxseed and linseed cake to determine the oil content of these products has been developed by the Chemical Research Laboratory of the Bureau of Agricultural Economics, Department of Agriculture.

Laboratory research has shown a wide variation to exist in the oil content of the various qualities and classes of foreign and domestic grown flaxseed. Extensive tests have been made of the flaxseed crops for the years 1919-24, inclusive, the result of which has been the development of a method of testing which in 15 minutes gives correct oil content.

Details of the Department's study, together with a description of the test method recommended, have been published in United States Department of Agriculture, Department Bulletin 1471-D, entitled "Oil Content of Flaxseed, with Comparisons of Tests for Determining Oil Content," copies of which may be had of Federal Grain Supervisors or upon request to the Department of Agriculture, Washington, D. C.

The bulletin deals with the production and consumption of flaxseed in the United States, world production and trade in flaxseed, oil content of flaxseed by classes, physical tests for determining oil content, inspection and grading of flaxseed, relation between numerical grade of domestic flaxseed and oil content of the sample, and a simple, rapid test for determining oil content, and should be of interest to all who handle linseed.

Oilseed Cake Proves Valuable in Commerce

United States Exports About Fourth of World's Output, Around 3,000,000 Tons

Oilseed cake and meal, derived largely from cottonseed, linseed, sunflower, peanut and coconut, furnish an item that approach an $80,000,000 value in world commerce, the Foodstuffs Division of the Department of Commerce announced in a statement recently. About one-fourth of all the exports, particularly cottonseed cake and meal and linseed cake, originate in the United States, according to the statement. The full text of the announcement follows:

The United States exports about one-fourth of the world's total export of oilseed cake and meal, of which 2,000,000 to 3,000,000 tons valued at from $70,000,000 to $80,000,000 enter annually into international commerce, being used chiefly for cattle feed.

Exports in Tonnage

In 1925 (the latest year for which comparable data are available for most of the important countries dealing in oilseed cake) the United States exported 675,000 metric tons (744,000 short tons) or about one-fourth of the world total. The next most important sources of these products are Germany, Russia, India, France, Egypt, the Philippine Islands, Italy, the Netherlands, Argentina and Canada. The United Kingdom is an important re-exporting country. There are a number of exporting countries of secondary importance, among which may be mentioned Brazil, Peru, British East Indies, Czechoslovakia, and Spain.

Of the importing countries Denmark stands far in the lead, with 753,000 tons or more than one-fourth of the world total, followed by the United Kingdom, Germany, the Netherlands, Belgium, Sweden, and France. Other importing countries which purchase relatively large amounts of oilseed cake are Ceylon, Japan, Norway, and Switzerland, the first two taking as much as 50,000 tons in some years.

Handled in Commerce

At least 10 kinds of oilseed cake are handled in international commerce, the most important being cottonseed, linseed, sunflower, peanut, and coconut. Seeds of secondary importance in the manufacture of oilseed cake are rape, hemp, soy beans, sesame, palm kernels, and castor beans.

The chief sources of cottonseed cake and meal are the United States and Egypt; sources of lesser importance are Brazil, Peru, India, Chile and Mexico. The total exports from these minor countries amount to about 60,000 tons yearly, compared with 400,000 from the United States and 130,000 from Egypt.

Linseed cake is derived chiefly from the United States, Russia, Germany, India, Argentina and Canada. Sunflower, rape and hemp seed are obtained mostly from Russia, though Poland, Denmark, Rumania and Latvia also export considerable sunflower seed cake.

Exports of Peanut Cakes

India and France are the chief exporters of peanut cake, the Philippines of coconut cake, and Manchuria of soy-bean cake. Castor-bean and sesame-seed cake are exported mainly through India and the surrounding countries, while palm-kernel cake is exported chiefly from Germany and the United Kingdom—*Jour. of Com.*

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